Assembly for supporting an object

The invention relates to an assembly, comprising a first object and a second object, and means for the defined support of the first object on the second object, the means including three individual protrusions. Assemblies of this type are known in the technical field, the protrusions usually being indicated as legs. The known support assemblies provide a satisfactory hold on a horizontal, smooth base. A direction of the first object relative to the second object is thereby indeterminate.

The present invention in a very simple manner enables determining also the direction of the first object relative to the second object, and is characterized in that the individual protrusions are provided with at least virtually sphere-segment shaped extremities, that the means also include three pairs of protrusions, combining with the individual protrusions, which are likewise provided with at least virtually sphere-segment shaped extremities, and that in an operational condition each individual protrusion of the one object contacts a corresponding pair of protrusions of the other object. After placing, the position of the first object relative to the second object is completely determined. An additional advantage is that the assembly is virtually unsusceptible to pollution and that any pollution can be removed very simply. It is moreover true that the assembly can be fitted in a simple manner, without the surfaces of the first object or the second object requiring a pre-treatment.

A preferred and conceptually logical embodiment of the invention is characterized in that the first object is provided with three protrusions, the centres of their sphere-segment shaped extremities defining a first

triangle, that the second object is provided with three pairs of protrusions, the three pairs defining a second triangle which at least virtually corresponds with the first triangle, and that in an operational condition each individual protrusion of the first object rests on the corresponding pair of protrusions of the second object.

A preferred embodiment of the assembly, ensuring optimal stability, is characterized in that a connecting line between two centres of the sphere-segment shaped extremities of a pair runs at least substantially perpendicularly to a bisector of the angle of the second triangle where the pair is positioned. If conditions permit, the stability may be further enhanced by selecting for the second triangle one which is at least virtually equilateral.

A further preferred embodiment enabling simple dimensioning is characterized in that for the three pairs the midpoints of the three connecting lines between the two centres of the sphere-segment shaped extremities define a third triangle, and that this third triangle is at least virtually similar to the first triangle.

A specially preferred embodiment according to an aspect of the invention is characterized in that the protrusions are formed by metal balls, which are partially incorporated in the first object or in the second object. Metal balls, and particularly steel ones, combine great accuracy with exceptional hardness, which renders them extremely suitable for this application. They may moreover be fitted simply in the first object or the second object, by drilling a hole in it with a slight undersize, and pressing the ball home into the hole.

A further preferred embodiment is characterized in that all metal balls have a virtually equal diameter.

The inventive assembly discussed so far does not preclude, for instance, that an accurately positioned first object is lifted from the second object in a single movement or drops off it due to shocks or vibrations. A preferred embodiment that eliminates this potential drawback is characterized in that means are provided for the mutual fastening of the combined objects. The means then preferably include a screwed connection, a spring or a magnet.

The invention also relates to an object furnished with individual protrusions and/or pairs of protrusions, suitable for application in an assembly according to the invention.

The invention relates besides to a method for the reproducible supporting of a first object on a second object, three holes being made in the first object, in which subsequently are fitted three metal balls or objects with a ball-shaped extremity, the centres of the balls or ball-shaped extremities defining a first triangle. The inventive method is characterized in that in the second object three pairs of holes are made, in which subsequently are fitted three pairs of metal balls or objects with a ball-shaped extremity, the three pairs defining a second triangle which is at least virtually similar to the first triangle, the three balls or ball-shaped extremities of the first object then being placed on the three pairs of balls or ball-shaped extremities of the second object.

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The invention will now be explained in detail with reference to the following Figures, where:

Fig. 1 schematically represents a part of a second object, provided with three pairs of steel balls;

Fig. 2 schematically represents a sole of a first object, provided with three steel balls;

Fig. 3A schematically represents a side elevation of the first object positioned on the second object;

Fig. 3B schematically represents a fastening using a magnet;

Fig. 3C schematically represents a fastening using a spring.

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Fig. 1 schematically represents a second object 1, provided with three pairs of steel balls 2a,2b, 3a,3b, 4a,4b, on which a first object (not yet shown in the Figure) can be supported. For the attachment of the balls, holes have previously been drilled into second object 1, in which the balls have subsequently been pressed or glued or otherwise fitted. For a stable support, an accurate positioning of the balls is not essential. Usually, however, it will be deemed desirable to accurately determine the position of the first object relative to the second object. In that case, it is important for the balls to be placed accurately in a previously determined pattern. An added advantage is that it is generally unnecessary for the second object to be previously planed or be subjected to some other pre-treatment. It is sufficient, for instance, to drill the holes using a numerically controlled drilling machine.

Centrally among the pairs of balls, a provision may be fitted for fastening a first object once it has been placed, the provision in this case being in the shape of a hole 5, provided with an inside thread.

Fig. 2 schematically represents an underside of a first object 6, provided with three steel balls 7, 8, 9, with which first object 6 can be supported on second object 1, and more particularly on the three pairs of steel balls 2a,2b, 3a,3b, 4a,4b. Centrally among the balls a hole 10 has been made, through which a bolt (not shown) can be inserted and subsequently screwed into hole 5, to fasten the first object. The bolt prevents the first object from dropping from the second object; the actual position, on the other hand, is totally determined by ball 7 resting between balls 2a,2b, ball 8 resting between balls 3a,3b and ball 9 resting between balls 4a,4b.

In Fig. 1 and Fig. 2 the positions of the ball pairs 2a,2b, 3a,3b, 4a,4b and of balls 7, 8, 9 are indicated as vertices of two triangles which are, at least if the first object is viewed from above, identical. The latter proves to be non-essential. A stable and accurate support can also be obtained if both triangles differ somewhat and are, for instance, only similar. Likewise a rotation of the pairs of balls in the plane of the drawing has no discernible effect and provides practically always a stable and accurate support. Neither is it necessary for the ball diameters to be equal.

It is, of course, also possible to provide the first object with two individual balls and a single pair of balls, and the second object with two pairs of balls and a single individual ball, such that in an operational condition each individual ball again corresponds with a pair of balls.

Fig. 3A schematically represents in side elevation the first object 6, as it rests on the second object 1, ball 7 fitting between balls 2a,2b, ball 8 between balls 3a,3b and ball 9 between balls 4a,4b.

Fig. 3B schematically represents in cross-section a fastening using a magnet 11, glued on first object 6. For a proper working it is necessary for second object 1 to be made of a ferromagnetic material, or alternatively be provided at its surface opposite magnet 11 with a plate of a ferromagnetic material or a second magnet. In Fig. 3B, in first object 6 no balls 7, 8, 9 are used, but pins 12, 13, 14, each having one flat end and one sphere-segment shaped end, the rounded extremities in the depicted operational condition combining with the ball pairs 2a,2b, 3a,3b, 4a,4b of the second object 1.

Fig. 3C schematically represents a fastening using a spring 15, one of whose ends is fitted to the second object 1, which is attached to the first object 6 with a steel or synthetic band 16.